

REMARKS

Claims 1-38 are now pending in the application. By this amendment, Claims 1, 3-15, and 17-18 have been amended, Claims 2 and 16 have been cancelled, and Claims 19-38 have been added. The basis for these amendments can be found throughout the specification, claims, and drawings originally filed. No new matter has been added. The preceding amendments and the following remarks are believed to be fully responsive to the outstanding Office Action and are believed to place the application in condition for allowance.

The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained therein.

REJECTION UNDER 35 U.S.C. § 102

Claims 1 and 5 are rejected under 35 U.S.C. § 102(b) as being anticipated by Saitoh (U.S. Pat. No. 6,093,964).

This rejection is respectfully traversed.

Claim 1 calls for the resist layer having an "inner surface having a portion projecting inwardly in the through-hole" while Claim 15 calls for "each of the metal posts having its side surface in which is formed a recess." See Specification at pg. 24, Ins 5-17 and Figure 5. In this manner, the present invention discloses a recess (36) for receiving solder or brazing materials which overflow during application of the soldering material to a bump (34). The recess (36) is formed by the shape of a through hole (22) formed in a resist layer (20). See Figure 5. The through hole (22) includes a series of

projections (24), whereby the projections (24) are operable to form the depressions or recesses (36) in the metal layers (30). See Specification at pg. 24, Ins. 1-6.

Saitoh fails to disclose such a relationship. Specifically, Saitoh teaches a bump (10) conforming to the shape of a photoresist (7). However, the bump (10) does not include a recess formed on the side of the bump (10), but rather, discloses a depression formed on a top surface of the bump (10). See Saitoh at Figures 3, 4, and 7. In this manner, the photoresist (7) of Saitoh fails to form a depression or excess solder receiving recess formed on a side surface of the bump (10).

Claim 3 recites “the through-hole having a ring shape so that part of the resist layer remains at the center of the through-hole” while Claim 17 recites “each of the metal posts having a hole exposing the pad.” See Specification at pg. 34, Ins. 21-27, pg. 35, ln. 1, and Figure 12B. In this regard, the present invention discloses a depression (102) formed in the bump (100) having a generally circular shape for receiving soldering or brazing material. The depression is formed in the bump (102) such that a portion of the pad (12) is exposed. See Figure 12B.

Saitoh fails to disclose such a relationship. As previously discussed, Saitoh discloses a depression formed on a top surface of the bump (10). In this manner, Saitoh fails to disclose a metal post having a “through-hole” or a “hole exposing the pad.”

Claim 4 calls for “a space between each of the metal posts” while Claim 18 calls for “a space being provided between each of the metal posts.” See Specification at pg. 33, Ins. 13-23 and Figures 10 and 11. In this manner, the present invention discloses a region (76) formed between adjacent bumps (74) on each pad (12) to absorb part of the

soldering or brazing materials (80) flowing outside the bumps (74) upon melting. Specifically, the regions (76) are operable to prevent the melted soldering or brazing materials from spreading in the direction parallel to the surface of the semiconductor chip (10). See Specification at pg. 33, Ins. 16-23 and Figure 10.

Saitoh fails to disclose such a relationship. As previously discussed, Saitoh discloses a depression formed on a top surface of the bump (10). In this manner, Saitoh fails to disclose a recess or region formed between the metal posts (10) to adsorb excess soldering or brazing materials.

Because Saitoh fails to teach a bump having a recess formed in a side surface of a bump, a through-hole formed in the bump, or a region formed between the metal posts to adsorb excess soldering or brazing materials, Applicants respectfully submit that Saitoh fails to teach each and every element of the present invention. In light of the remarks contained above with respect to independent Claims 1, 3, 4, 15, 17, 18 it is believed that Claim 5, respectively dependent therefrom, is similarly distinguishable over the art of record. Accordingly, reconsideration and withdrawal of the rejection is respectfully requested.

Claims 1, 6, 15 and 17 are rejected under 35 U.S.C. § 102(b) as being anticipated by Dion (U.S. Pat. No. 5,130,275).

This rejection is respectfully traversed.

Claim 1 calls for the resist layer having an “inner surface having a portion projecting inwardly in the through-hole” while Claim 15 calls for “each of the metal posts having its side surface in which is formed a recess.” See Specification at pg. 24, Ins 5-17 and Figure 5. Applicant respectfully submits that the remarks contained above with

respect to the Saitoh rejection are similarly applicable to the rejection in view of Dion. Specifically, Dion fails to disclose a bump structure having an excess solder receiving recess formed on a side of a bump. Rather, Dion discloses the use of a photoresist layer (28), whereby the photoresist layer (28) includes an opening (30) having "approximately the same shape as interconnect pads (14)." See Dion at Col. 6, Ins. 16-17. In this manner, the openings (30) of Dion, comprise generally square shapes, thereby forming a bump (34). However, these bumps (34) only include a top surface depression. See Figures 7 and 8 of Dion. In this regard, Dion is distinguished from the present invention.

Because Dion fails to teach a bump having a recess formed in a side surface of a bump, a through-hole formed in the bump, or a region formed between the metal posts to adsorb excess soldering or brazing materials, Applicants respectfully submit that Dion fails to teach each and every element of the present invention. In light of the remarks contained above with respect to independent Claims 1, 3, 4, 15, 17, 18 it is believed that Claim 17, respectively dependent therefrom, is similarly distinguishable over the art of record. Accordingly, reconsideration and withdrawal of the rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 103

Claims 2-4, 7, 8, 16 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Saitoh or Dion in view of Chen (U.S. Pat. No. 6,191,023).

Claims 9-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Saitoh or Dion in view of Watanabe et al. (U.S. Pat. No. 6,218,281).

These rejections are respectfully traversed.

As previously discussed, Applicants assert that both Dion and Saitoh are distinguished from the present invention because both Dion and Saitoh, either in combination or alone, do not disclose a bump having a recess formed in a side surface of a bump, a through-hole formed in the bump, or a region formed between the metal posts to adsorb excess soldering or brazing materials. Because both Dion and Saitoh do not disclose such a relationship, and none of the cited references cures this deficiency on Dion and Saitoh, Applicant's invention is not taught or suggested by the prior art and reconsideration and withdrawal of the rejection is respectfully requested.

In this manner, it is believed that dependent Claims 5-14 and 19-38 are in a condition for allowance in light of the art of record. Accordingly, reconsideration and withdrawal of the rejections is respectfully requested.

NEW CLAIMS

New Claims 19-38 have been added for consideration. Support for the new claims can be found in the specification, claims, and drawings as originally filed. No new matter has been added.

CONCLUSION

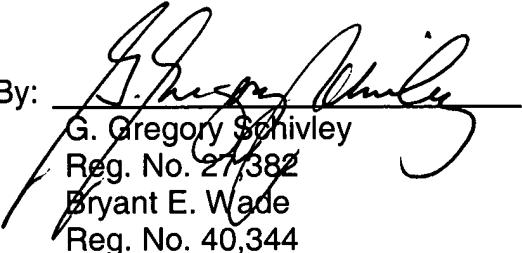
It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office

Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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